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IDENTIFIERS *Meta Analysis

ABSTRACT

The educational literature on tutoring programs indicates definite and positive effects on the academic performance and attitudes of those who receive tutoring. Such students outperform their peers on examinations, and they express more positive attitudes toward the subjects in which they are tutored. Tutoring programs also have positive effects on children who serve as tutors. These tutors not only develop more positive attitudes toward the tutored subject, but they also gain a better understanding of these areas. Tutoring programs have a smaller effect on the self-concept of children. The effects of tutoring programs on the correlation between aptitude and achievement also appear to be negligible. The meta-analysis in this report concluded in results that are consistent with those of other reviewers, but also raised questions concerning the interpretation of educational research findings. (Author/GK)

Educational Outcomes of Tutoring: A Research Synthesis

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My presentation this morning is on the educational outcomes of tutoring. In recent years, thousands of schools throughout the country have developed tutoring programs for their pupils, and hundreds of educators and educational researchers have written about the effects of such programs on children. These programs take a number of different forms, but in most of them children are tutored either by other children or by paraprofessionals rather than by regular school teachers.

In the past decade a number of reviews of experimental studies of tutoring have appeared in the educational literature. Although the major conclusions reached in these reviews were similar and positive in tone, all of them used subjective, narrative techniques for summarizing and synthesizing evaluation findings, and so the reliability of their detailed findings is still open to question.

In 1977, Susan Hartley carried out a synthesis of evaluation findings in elementary and secondary schools that used the more objective, meta-analytic approach to research integration. Her study focused on tutoring and other methods of individualizing mathematics teaching, and she found that the effects of tutoring were more positive than the effects of other individualizing techniques such as computer-based instruction, individual learning packages, and programmed instruction.

Hartley's meta-analysis, however, focused exclusively on mathematics teaching, so we don't know how generalizable the effects are to other subject matters. In addition, Hartley studied only achievement effects, and so could not say whether tutoring had positive or negative effects on other instructional outcomes. Her analysis also suffered from what we, in our work, have considered to be some methodological weaknesses. For example, she aggregated effects on those being tutored and on those providing tutoring; she based her analysis on far more findings than independent studies; and she included in her pool some studies that lacked a control group.

The meta-analysis we conducted on the effects of tutoring covered studies in a variety of areas, and described results for different kinds of school outcomes. We treated separately outcomes for pupil tutors and tutees, and included only studies which met reasonable methodological standards.

Methods

Our bibliographic computer search yielded a total of more than 500 titles. We obtained copies of 250 potentially useful documents and read them in full. A total of 65 of the 250 reports contained data that could be used in the meta-analysis.

The 65 studies were of many different types. To describe the main features of the studies, we defined a number of study feature variables. The methodological, course setting, and publication study feature variables were similar to those we have used in previous meta-analyses (e.g., J. A. Kulik, C.-L. C. Kulik, & Cohen, 1980). We also coded four variables describing the types of tutoring programs used in the studies: whether the

tutoring was structured or nonstructured; whether the tutoring was encouraged or not; whether tutoring was a supplement to or a substitute for classroom instruction; and whether or not tutors received training.

Results

Now I would like to summarize the results of the tutoring meta-analysis. The 65 studies described effects of tutoring programs on both tutors and tutees. These effects were in four major areas: pupil achievement, the correlation between aptitude and achievement, self-concept, and attitude toward subject matter.

Effects on Tutees

First, I'll discuss the effects of tutoring programs on the children who received tutoring.

Achievement effects. Fifty-two of the 65 studies examined the effect of tutoring on tutee achievement. Overall, pupils who were tutored outperformed pupils who were not tutored in 87% of these studies. Of the studies reporting statistically significant differences between teaching approaches, 95% favored tutees. Clearly, a distinct majority of studies favored pupils who were tutored.

By using the index of Effect Size (ES), we were able to describe the influence of tutoring with greater precision (Figure 1). The average ES in the 52 studies was .40, which implies that in a typical class, tutoring raised the performance of tutored pupils by two-fifths of a standard-deviation-unit. Put in another way, 66% of the pupils who received tutoring outperformed the average non-tutored pupil. This can be considered a moderate-sized effect.

A primary purpose of meta-analysis is to relate characteristics of studies to outcomes. Further analyses showed that studies with certain features consistently produced strong effects. In all, six features were significantly related to size of effect. Tutoring effects were larger in the more structured programs (Figure 2) and in programs of shorter duration (Figure 3). The effects were also larger when lower-level skills were taught and tested on the examinations (Figure 4) and when mathematics rather than reading was the subject of tutoring (Figure 5). Effects were larger on locally developed tests and smaller on nationally standardized tests (Figure 6). Finally, studies published in dissertations reported smaller effects than studies reported in journal articles or unpublished documents (Figure 7).

Aptitude-achievement correlation effects. For the analysis dealing with aptitude-achievement correlations, we found 12 studies reporting correlations separately for tutees and conventional pupils. The average aptitude-achievement correlation was .63 for tutored students in the 12 studies, and it was also .63 for non-tutored students. Evidently, being tutored had no effect on the correlation between aptitude and achievement.

Self-concept effects. Nine studies reported data on tutee self-concept. In seven of these studies, self-concept was higher for tutees than for conventional pupils. However, the average effect size for the nine studies was only .09, clearly a small effect.

Attitude toward subject matter effects. In all eight studies providing data on pupil attitude toward the subject matter, pupil attitudes were more positive for pupils being tutored. However, only one study showed statistical significance. The average ES was .29.

Effects on Tutors

Now I'd like to turn to the effects of tutoring programs on pupils who provided the tutoring.

Achievement effects. Overall, the examination performance of tutors was better than the examination performance of pupils in a conventional class in 87% of the 38 studies. Ten of the comparisons reported statistically significant results, and in each case the difference favored tutors. The average ES in the 38 studies was .33 (Figure 8), or in other words, was large enough to move tutors from the 50th to the 63rd percentile on examinations in the subject matter they were teaching.

Aptitude-achievement correlation effects. Eleven studies reported aptitude-achievement correlations for tutors and conventional pupils. In only two studies was there a significant difference in aptitude-achievement correlations, and these two studies showed a higher correlation for pupils serving as tutors. For the 11 studies, the average aptitude-achievement correlation was .74 for tutors and .67 for conventional pupils. This corresponded to an effect size (q) of .14, a small effect.

Self-concept effects. Sixteen studies reported data on self-concept. In three-quarters of these studies self-concept was higher for tutors than for conventional pupils, but the average ES for self-concept was only .18.

Attitude toward subject matter. Only five studies presented data on attitude toward subject matter, and in four of these studies the subject attitudes were more positive for tutors. The average ES for attitude toward the subject was .42, a medium size effect.

Discussion

The message from the educational literature on tutoring programs seems clear enough. These programs have definite and positive effects on the academic performance and attitudes of those who receive tutoring. Tutored pupils outperform their peers on examinations, and they express more positive attitudes toward the subjects in which they are tutored. Tutoring programs also have positive effects on children who serve as tutors. These tutors not only develop more positive attitudes toward the subject of their tutoring, but they also gain a better understanding of these areas.

Tutoring programs apparently have much smaller effects on the self-concepts of children. Neither tutors nor tutees change in self-esteem as a

result of tutoring programs. The effects of tutoring programs on the correlation between aptitude and achievement also appears to be negligible.

Our meta-analytic results are generally consistent with what other reviewers have said about tutoring studies. Structured tutoring programs turned out to have a better record of effectiveness than did less structured programs, although these less structured programs still made a contribution to learning. We found that the degree of effectiveness depended on whether locally-developed or standardized tests were used in the evaluation. Results were considerably stronger when tests were developed locally. We also found larger effects of tutoring for studies in mathematics.

This meta-analysis also poses some interesting questions concerning the interpretation of educational research findings. For example, we found, in this meta-analysis, that journal articles reported stronger effects than dissertations, and this result has been reported frequently in other meta-analyses. Which results--the stronger results from journal articles or the weaker results from dissertations--should we accept as the more accurate? If the selection process that eventually leads to publication of research is based on the strength of findings, then the least selected results, in other words, those from dissertations, would provide the best basis for estimating size of effects. If instead, the selection process is based on the quality of research design, then the most selected results, that is, those from journal articles, would provide the best basis for estimates of effect size.

To sum up, our meta-analysis confirmed some things that have long been suspected about tutoring. As many commentators have suggested, tutoring benefits both tutors and tutees on both the cognitive and affective levels. In addition, the meta-analysis allows us to ascertain the average strength of tutoring effects, and it identifies the settings and conditions where effects are strongest. Finally, I think this meta-analysis has raised some new questions about tutoring and provided a challenge for other investigators to identify the key factors underlying variation in tutoring outcomes.

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Kulik, J. A., Kulik, C.-L. C., & Cohen, P. A. Effectiveness of computer-based college teaching: A meta-analysis of findings. Review of Educational Research, 1980, 50, 525-544.

Note

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Figure Captions

Figure 1. Distribution showing the effects of tutoring on tutee achievement in 52 studies.

Figure 2. Effects on tutee achievement of structured and nonstructured tutoring.

Figure 3. Effects on tutee achievement of tutoring programs of different lengths.

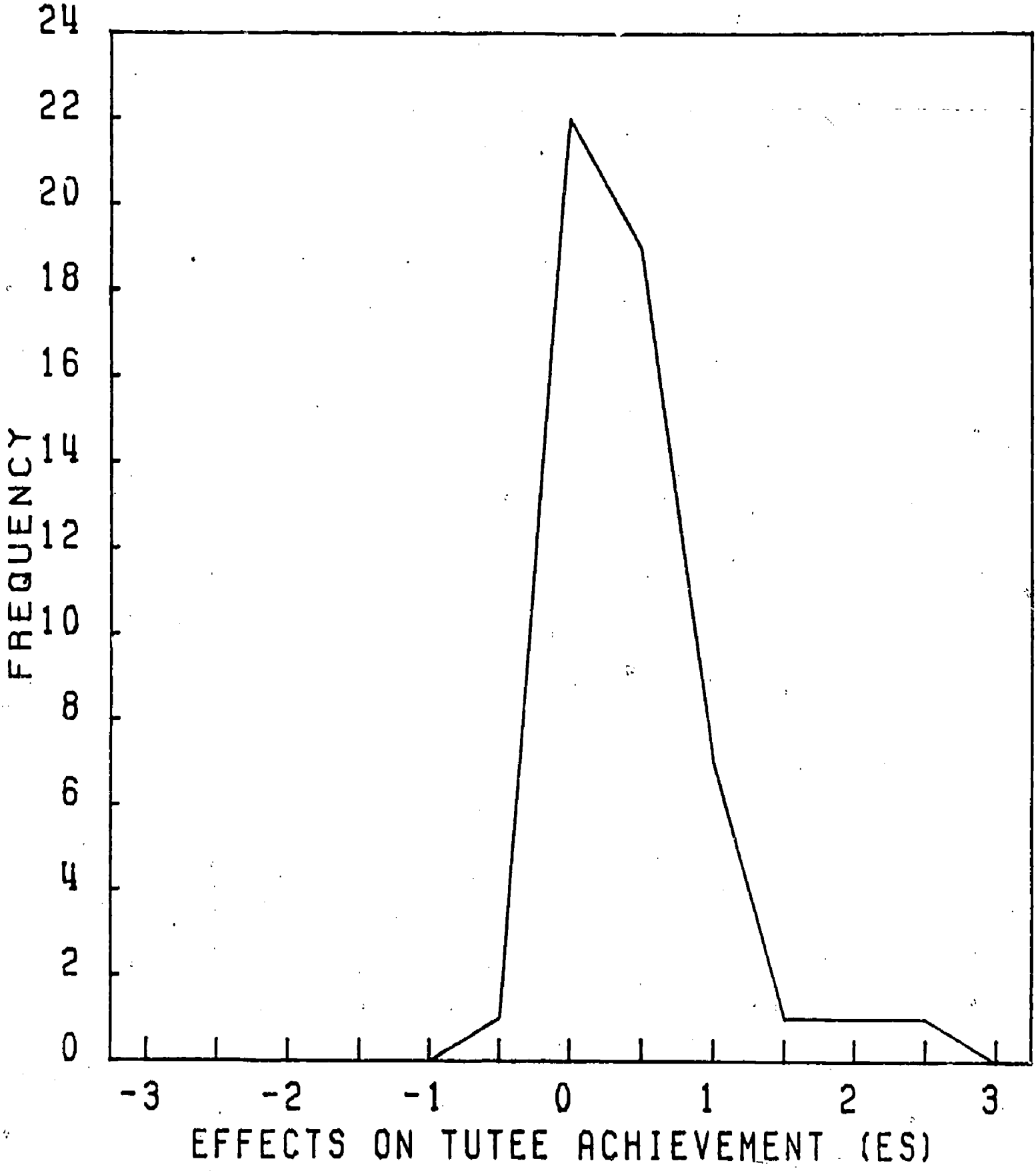
Figure 4. Effects on tutee achievement of tutoring programs emphasizing different levels of cognitive skill.

Figure 5. Effects on tutee achievement of tutoring programs in different school subjects.

Figure 6. Effects on tutee achievement of tutoring programs using local vs. standardized tests as criterion measures.

Figure 7. Effects on tutee achievement reported in studies from three different sources.

Figure 8. Distribution showing the effects of tutoring on tutor achievement in 38 studies.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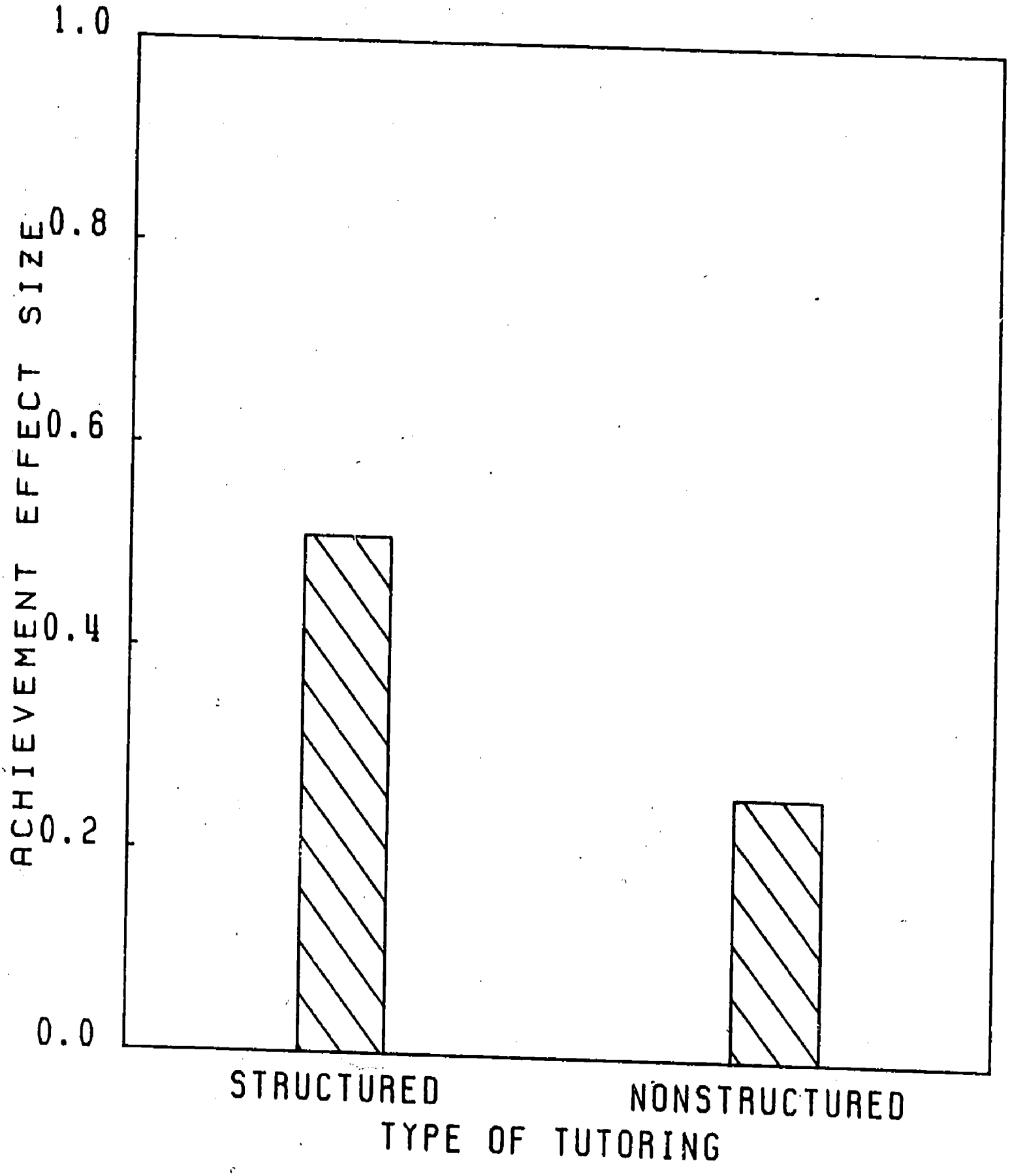
EFFECTS ON TUTEE ACHIEVEMENT (ES)

Figure 1


1.0
0.8
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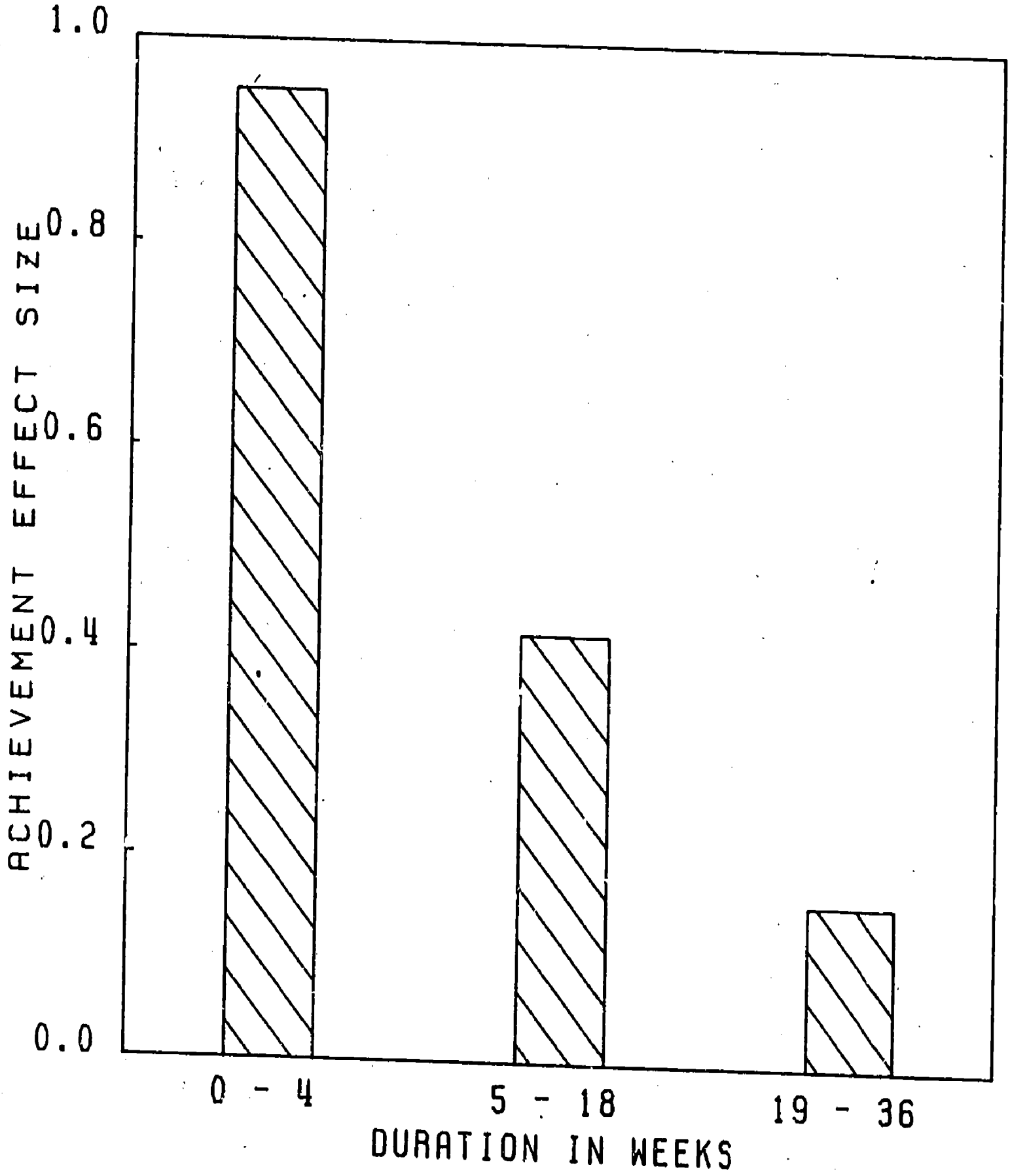
0.2
0.0
ACHIEVEMENT EFFECT SIZE
STRUCTURED
NONSTRUCTURED
TYPE OF TUTORING

Figure 2


1.0
0.8
0.6
0.4
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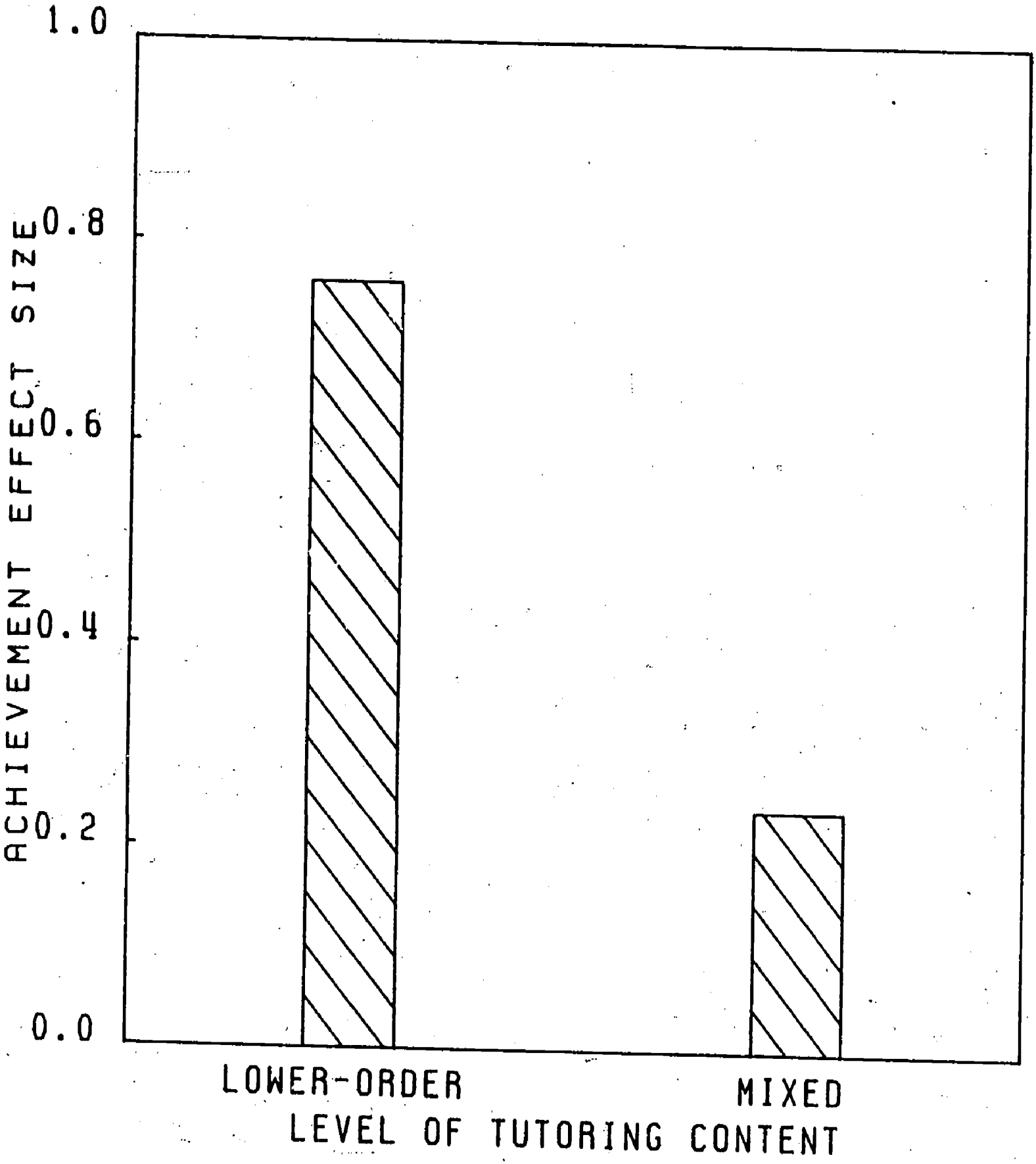
ACHIEVEMENT EFFECT SIZE
0 - 4
5 - 18
19 - 36
DURATION IN WEEKS

Figure 3


1.0
0.8
0.6
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0.0
ACHIEVEMENT EFFECT SIZE
LOWER-ORDER
MIXED
LEVEL OF TUTORING CONTENT

Figure 4

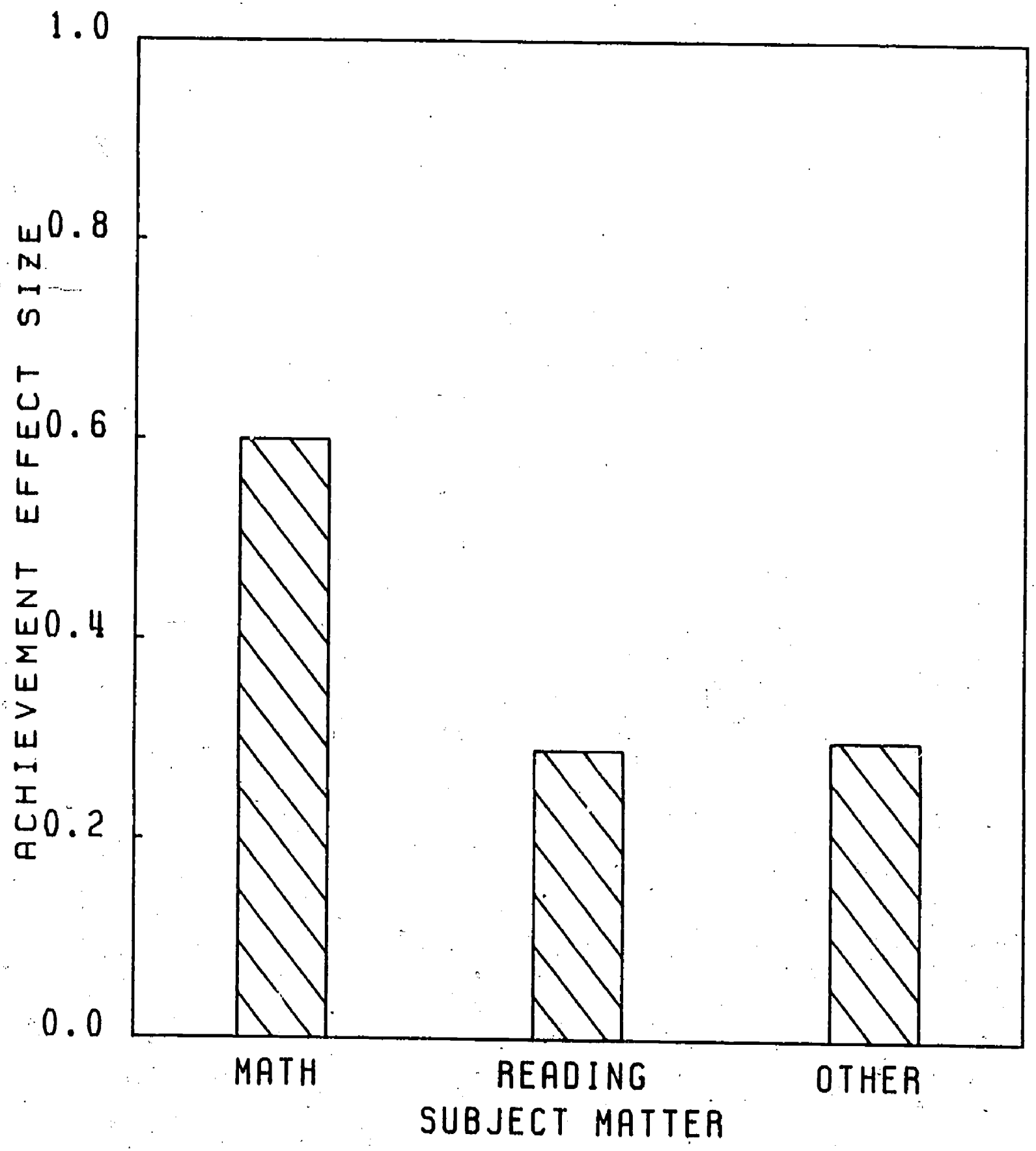
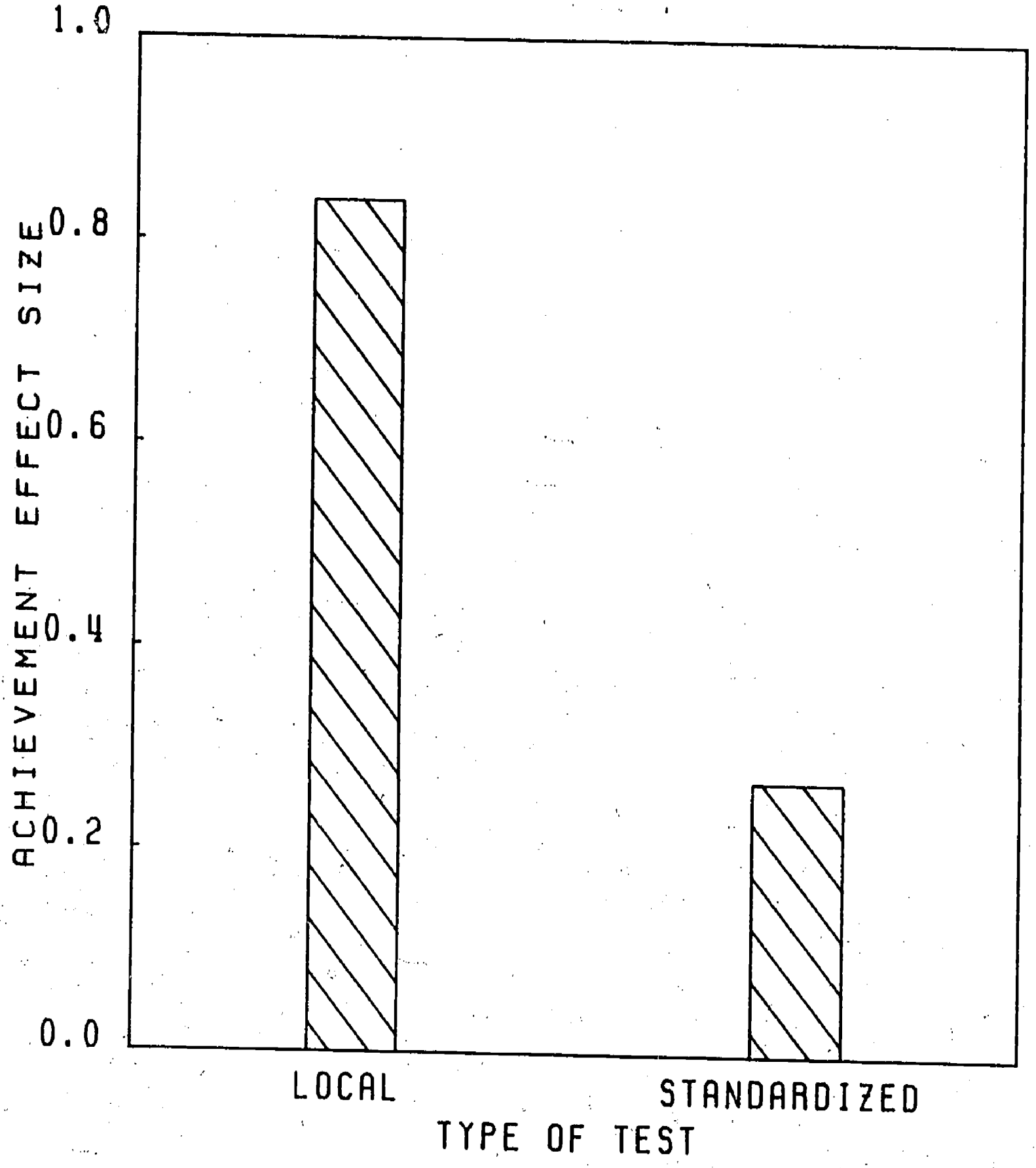

1.0
0.8
0.6
0.4
0.2
0.0
ACHIEVEMENT EFFECT SIZE
MATH
READING
OTHER
SUBJECT MATTER

Figure 5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0.4
0.2
0.0
ACHIEVEMENT EFFECT SIZE
LOCAL
STANDARDIZED
TYPE OF TEST

Figure 6

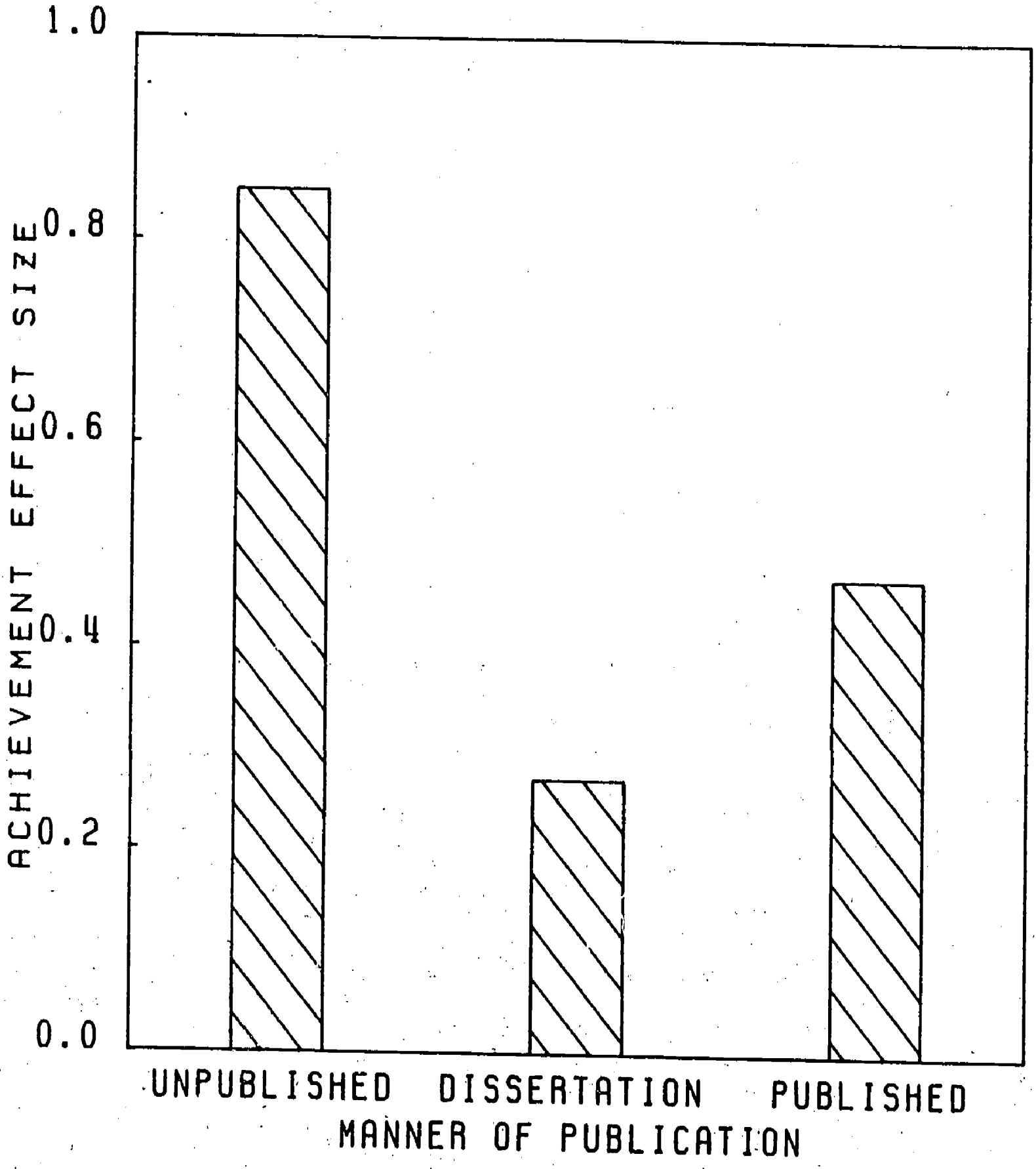
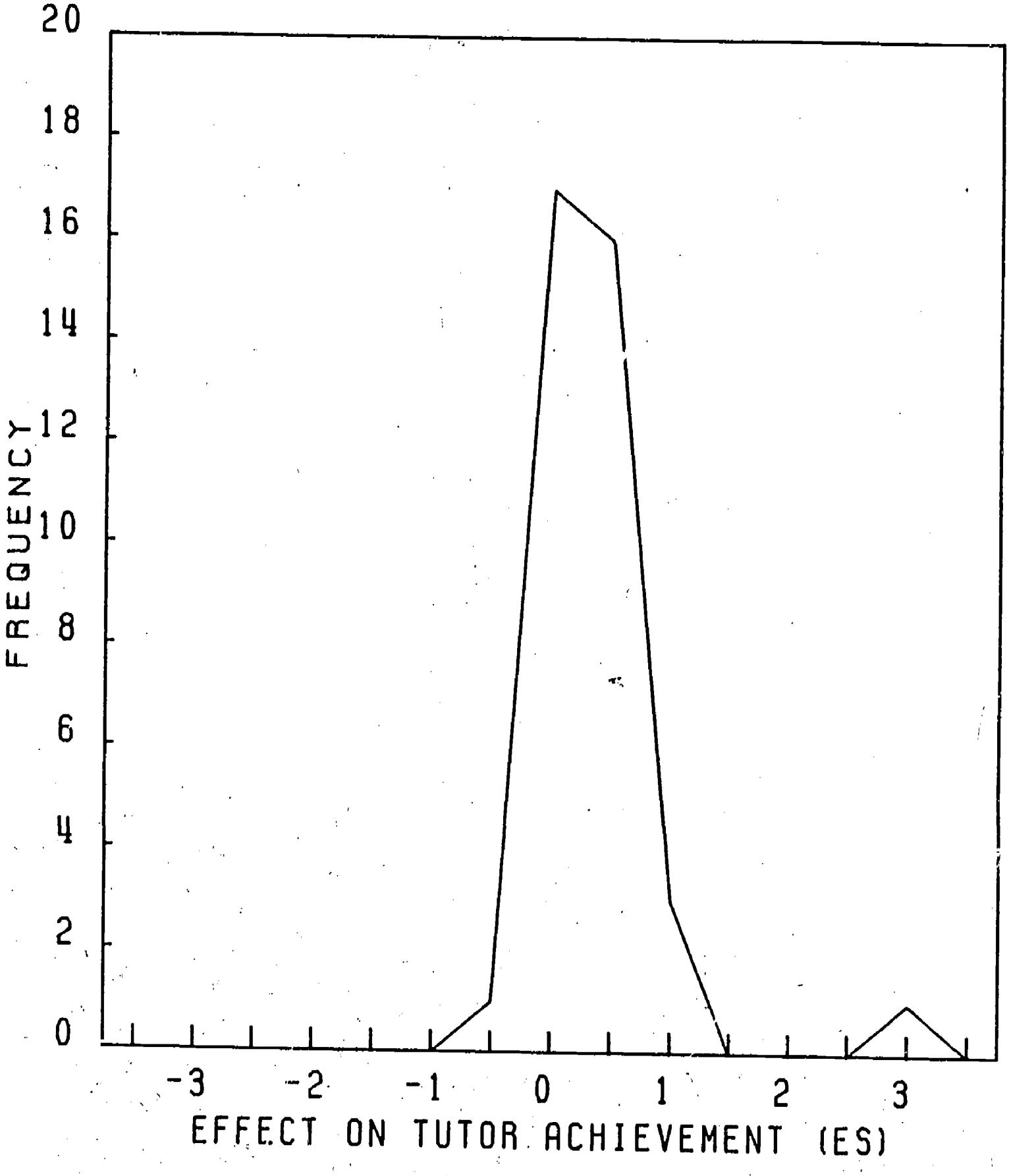

1.0
0.8
0.6
0.4
0.2
0.0
ACHIEVEMENT EFFECT SIZE
UNPUBLISHED
DISSERTATION
PUBLISHED
MANNER OF PUBLICATION

Figure 7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1
2
3
EFFECT ON TUTOR ACHIEVEMENT (ES)

Figure 8